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Orion Sky Lawlor, Laxmikant V. Kalée
June 2002   **Proceedings of the 16th International conference on Supercomputing**
Full text available: ▨ pdf(234.15 KB)   Additional Information: full citation, abstract, references, index terms

Two physical objects cannot occupy the same space at the same time. Simulated physical objects do not naturally obey this constraint. Instead, we must detect when two objects have collided---we must perform collision detection. This work presents a simple voxel-based collision detection algorithm, an efficient parallel implementation of the algorithm, and performance results.

Keywords: collision detection, contact, parallel geometry

2 Incremental 3D collision detection with hierarchical data structures   ▪
Tsai-Yen Li, Jin-Shin Chen
November 1998 **Proceedings of the ACM symposium on Virtual reality software and technology 1998**
Full text available: ▨ pdf(1.08 MB)   Additional Information: full citation, references, index terms

Keywords: collision detection, hierarchical bounding volumes, incremental algorithm, shape approximation

3 Collision detection: Minimal hierarchical collision detection   ▪
Gabriel Zachmann
November 2002 **Proceedings of the ACM symposium on Virtual reality software and technology**
Full text available: ▨ pdf(304.38 KB)   Additional Information: full citation, abstract, references, index terms

We present a novel bounding volume hierarchy that allows for extremely small data structure sizes while still performing collision detection as fast as other classical hierarchical algorithms in most cases. The hierarchical data structure is a variation of axis-aligned bounding box trees. In addition to being very memory efficient, it can be constructed efficiently and very fast.We also propose a criterion to be used during the construction of the BV hierarchies is more formally established than ...

Keywords: R-trees, hierarchical data structures, hierarchical partitioning, interference detection, physically-based modeling, virtual prototyping

4 Incremental algorithms for collision detection between solid models   ▪
Madhav Ponamgi, Dinesh Manocha, Ming C. Lin
December 1995 **Proceedings of the third ACM symposium on Solid modeling and applications**
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5 Collision detection and response for computer animationr3   ▪
Matthew Moore, Jane Wilhelms
June 1988   **ACM SIGGRAPH Computer Graphics , Proceedings of the 15th annual conference on Computer graphics and interactive techniques**, Volume 22 Issue 4
Full text available: ▨ pdf(3.12 MB)   Additional Information: full citation, references, citings, index terms

Keywords: analytical solution, collision detection, collision response, computer animation, dynamical simulation

6 V-COLLIDE: accelerated collision detection for VRML   ▪
Thomas C. Hudson, Ming C. Lin, Jonathan Cohen, Stefan Gottschalk, Dinesh Manocha
February 1997 **Proceedings of the second symposium on Virtual reality modeling language**
Full text available: ▨ pdf(913.46 KB)   Additional Information: full citation, references, citings, index terms

Keywords: collision detection, virtual reality modeling language (VRML)

7 Collision detection in aspect and scale bounded polyhedra

Subhash Suri, Philip M. Hubbard, John F. Hughes

January 1998   **Proceedings of the ninth annual ACM-SIAM symposium on Discrete algorithms**

Full text available: pdf(986.73 KB)   Additional Information: full citation, citings, index terms

8 Interval methods for multi-point collisions between time-dependent curved surfaces

John M. Snyder, Adam R. Woodbury, Kurt Fleischer, Bena Currin, Alan H. Barr

September 1993   **Proceedings of the 20th annual conference on Computer graphics and interactive techniques**

Full text available: pdf(422.51 KB)   Additional Information: full citation, references, citings, index terms

Keywords: inclusion function, interval Newton method, interval linear equation

9 Fast collision detection using QuOSPO trees

Taosong He

April 1999   **Proceedings of the 1999 symposium on Interactive 3D graphics**

Full text available: pdf(1.31 MB)   Additional Information: full citation, references, citings, index terms

Keywords: collision detection, hierarchical bounding volumes, orientation space quantization, primary orientations

10 I-COLLIDE: an interactive and exact collision detection system for large-scale environments

Jonathan D. Cohen, Ming C. Lin, Dinesh Manocha, Madhav Ponamgi

April 1995   **Proceedings of the 1995 symposium on Interactive 3D graphics**

Full text available: pdf(4.50 MB)   Additional Information: full citation, abstract, references, citings, index terms

we present an exact and interactive collision detection system, I-COLLIDE, for large-scale environments. Such environments are characterized by the number of objects undergoing rigid motion and the complexity of the models. The algorithm does not assume the objects' motions can be expressed as a closed form function of time. The collision detection system is general and can be easily interfaced with a variety of applications. The algorithm uses a two-level approach based on pruning multiple ...

11 Session 3: CLODs: dual hierarchies for multiresolution collision detection

Miguel A. Otaduy, Ming C. Lin

June 2003   **Proceedings of the Eurographics/ACM SIGGRAPH symposium on Geometry processing**

Full text available: pdf(1.19 MB)   Additional Information: full citation, abstract, references, index terms

We present *"contact levels of detail"* (CLOD), a novel concept for multiresolution collision detection. Given a polyhedral model, our algorithm automatically builds a "dual hierarchy", both a multiresolution representation of the original model and its bounding volume hierarchy for accelerating collision queries. We have proposed various error metrics, including object-space errors, velocity dependent gap, screen-space errors and their combinations. At runtine, our algorithm uses these err ...

12 Poster Session: Efficient Collision Detection for Curved Solid Objects

Elmar Schömer, Joachim Reichel, Thomas Warken

June 2002   **Proceedings of the seventh ACM symposium on Solid modeling and applications**

Full text available: pdf(213.25 KB)   Additional Information: full citation, abstract, references, index terms

The design-for-assembly technique requires realistic physically based simulation algorithms and in particular efficient geometric collision detection routines. Instead of approximating mechanical parts by large polygonal models, we work with the much smaller original CAD-data directly, thus avoiding precision and tolerance problems. We present a generic algorithm, which can decide whether two solids intersect or not. We identify classes of objects for which this algorithm can be e&# ...

Keywords: Collision Detection, Computational Geometry, Geometric Interrogations and Reasoning, Manufacturing and Assembly Planning

13 Motions & transformations: Collision prediction for polyhedra under screw motions

Byungmoon Kim, Jarek Rossignac

June 2003   **Proceedings of the eighth ACM symposium on Solid modeling and applications**

Full text available: pdf(246.45 KB)   Additional Information: full citation, abstract, references, index terms

The prediction of collisions amongst N rigid objects may be reduced to a series of computations of the time to first contact for all pairs of objects. Simple enclosing bounds and hierarchical partitions of the space-time domain are often used to avoid testing object-pairs that clearly will not collide. When the remaining pairs involve only polyhedra under straight-line translation, the exact computation of the collision time and of the contacts requires only solving for intersections between lin ...

Keywords: collision detection, polyhedra, screw motion

14 OBBTree: a hierarchical structure for rapid interference detection

S. Gottschalk, M. C. Lin, D. Manocha

August 1996   **Proceedings of the 23rd annual conference on Computer graphics and interactive techniques**

Full text available: pdf(341.04 KB)   Additional Information: full citation, references, citings, index terms

Keywords: collision detection, contacts, hierarchical data structure, physically-based modeling, shape approximation, virtual prototyping

15 Efficient collision detection for moving polyhedra
Elmar Schömer, Christian Thiel
September 1995 **Proceedings of the eleventh annual symposium on Computational geometry**
Full text available: pdf(963.80 KB)   Additional Information: full citation, references, citings, index terms

16 Red-Blue intersection detection algorithms, with applications to motion planning and collision detection
P. Agarwal, M. Sharir
January 1988 **Proceedings of the fourth annual symposium on Computational geometry**
Full text available: pdf(1.10 MB)   Additional Information: full citation, abstract, references, citings, index terms

Let &Ggr; be a collection of n (possibly intersecting) "red" Jordan arcs of some simple shape in the plane and let &Ggr;' be a similar collection of m "blue" arcs. We present several efficient algorithms for detecting an intersection between an arc of &Ggr; and an arc of &Ggr;'. (i) If the arcs of &Ggr;' form the boundary of a simply connected region, then we can detect a "red-blue" intersection in time &Ogr;

17 Sensation preserving simplification for haptic rendering
Miguel A. Otaduy, Ming C. Lin
July 2003   **ACM Transactions on Graphics (TOG)**, Volume 22 Issue 3
Full text available: pdf(2.06 MB)   Additional Information: full citation, abstract, references, index terms

We introduce a novel "sensation preserving" simplification algorithm for faster collision queries between two polyhedral objects in haptic rendering. Given a polyhedral model, we construct a multiresolution hierarchy using " filtered edge collapse", subject to constraints imposed by collision detection. The resulting hierarchy is then used to compute fast contact response for haptic display. The computation model is inspired by human tactual perception of contact information. We have successfull ...

Keywords: collision detection, haptics, level-of-detail algorithms

18 Collision detection for fly-throughs in virtual environments
Martin Held, James T. Klosowski, Joseph S. B. Mitchell
May 1996 **Proceedings of the twelfth annual symposium on Computational geometry**
Full text available: pdf(227.40 KB)   Additional Information: full citation, references, citings, index terms

19 Six degree-of-freedom haptic display of polygonal models
Arthur Gregory, Ajith Mascarenhas, Stephen Ehmann, Ming Lin, Dinesh Manocha
October 2000 **Proceedings of the conference on Visualization '00**
Full text available: pdf(98.83 KB)   Additional Information: full citation, citings, index terms

Keywords: force-feedback devices, haptics, interactive computer graphics, virtual reality

20 Penetration analysis of solids
Jean-Francois Rameau, Sophie Robert
June 1993 **Proceedings on the second ACM symposium on Solid modeling and applications**
Full text available: pdf(341.15 KB)   Additional Information: full citation, references, index terms

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1 Gross motion planning—a survey   ■
Yong K. Hwang, Narendra Ahuja
September 1992 **ACM Computing Surveys (CSUR)**, Volume 24 Issue 3
Full text available: 📄 pdf(6.40 MB)   Additional Information: full citation, abstract, references, citings, index terms, review

Motion planning is one of the most important areas of robotics research. The complexity of the motion-planning
problem has hindered the development of practical algorithms. This paper surveys the work on gross-motion planning,
including motion planners for point robots, rigid robots, and manipulators in stationary, time-varying, constrained, and
movable-object environments. The general issues in motion planning are explained. Recent approaches and their
performances are briefly described, a ...

Keywords: collision detection, computational geometry, implementation, motion planning, obstacle avoidance, path
planning, spatial representation

2 Session 2: environments: Incorporating dynamic real objects into immersive virtual environments   ■
Benjamin Lok, Samir Naik, Mary Whitton, Frederick P. Brooks
April 2003   **Proceedings of the 2003 symposium on Interactive 3D graphics**
Full text available: 📄 pdf(4.31 MB)   Additional Information: full citation, abstract, index terms

We present algorithms that enable virtual objects to interact with and respond to virtual representations, *avatars*, of
real objects. These techniques allow dynamic real objects, such as the user, tools, and parts, to be visually and
physically incorporated into the virtual environment (VE). The system uses image-based object reconstruction and a
volume query mechanism to detect collisions and to determine plausible collision responses between virtual objects and
the avatars. This allows o ...

Keywords: collision detection, interactions in virtual environments, mixed reality

3 Computing curricula 2001   ■
September 2001 **Journal on Educational Resources in Computing (JERIC)**
Full text available: 📄 pdf(613.63 KB) 🔲 html(2.78 Additional Information: full citation, references, index terms
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4 Six degree-of-freedom haptic display of polygonal models   ■
Arthur Gregory, Ajith Mascarenhas, Stephen Ehmann, Ming Lin, Dinesh Manocha
October 2000 **Proceedings of the conference on Visualization '00**
Full text available: 📄 pdf(98.83 KB)   Additional Information: full citation, citings, index terms

Keywords: force-feedback devices, haptics, interactive computer graphics, virtual reality

5 Computer assisted robotic assembly   ⬓
M. D. Miller, C. P. Kosta, P. D. Krolak
June 1988   **Proceedings of the first international conference on Industrial and engineering applications of
             artificial intelligence and expert systems - Volume 2**
Full text available: 📄 pdf(404.54 KB)   Additional Information: full citation, references, index terms

6 The power crust   ⬓
Nina Amenta, Sunghee Choi, Ravi Krishna Kolluri
May 2001   **Proceedings of the sixth ACM symposium on Solid modeling and applications**
Full text available: 📄 pdf(1.17 MB)   Additional Information: full citation, abstract, references, citings, index terms

The *power crust* is a construction which takes a sample of points from the surface of a three-dimensional object and
produces a surface mesh and an approximate medial axis. The approach is to first approximate the medial axis
transform (MAT) of the object. We then use an inverse transform to produce the surface representation from the MAT.

This idea leads to a simple algorithm with theoretical guarantees comparable to those of other surface reconstruction
and medial axis approxi ...

7 Direct haptic rendering of sculptured models
Thomas V. Thompson, David E. Johnson, Elaine Cohen
April 1997 **Proceedings of the 1997 symposium on Interactive 3D graphics**
Full text available: pdf(1.32 MB)   Additional Information: full citation, references, citings, index terms

8 GNU/MAVERIK: a micro-kernel for large-scale virtual environments
Roger Hubbold, Jon Cook, Martin Keates, Simon Gibson, Toby Howard, Alan Murta, Adrian West, Steve Pettifer
December 1999 **Proceedings of the ACM symposium on Virtual reality software and technology**
Full text available: pdf(1.93 MB)   Additional Information: full citation, abstract, references, citings, index terms

This paper describes a publicly available virtual reality (VR) system, GNU/MAVERIK, which forms one component of a complete 'VR operating system'. We give an overview of the architecture of MAVERIK, and show how it is designed to use application data in an intelligent way, via a simple, yet powerful, callback mechanism which supports an object-oriented framework of classes, objects and methods. Examples are given which illustrate different uses of the system, and typical performance levels. ...

9 Using VRML in construction industry applications
Robert Lipman, Kent Reed
February 2000 **Proceedings of the fifth symposium on Virtual reality modeling language (Web3D-VRML)**
Full text available: pdf(945.65 KB)   Additional Information: full citation, abstract, references, citings, index terms

This paper describes initial research using the Virtual Reality Modeling Language (VRML97) in construction industry applications. The modeling of steel structures and construction equipment as objects for inclusion in construction-site world models was studied. The ultimate goal is to provide three-dimensional web-based technologies for managing, accessing, and viewing construction project information.

Keywords: VRML, computer-integrated construction, construction equipment, steel structures, virtual environments

10 Poster Session: Constraint-based motion planning for virtual prototyping
Maxim Garber, Ming C. Lin
June 2002   **Proceedings of the seventh ACM symposium on Solid modeling and applications**
Full text available: pdf(327.97 KB)   Additional Information: full citation, abstract, references, index terms

We present a novel framework for motion planning of rigid and articulated robots in complex, dynamic, 3D environments and demonstrate its application to virtual prototyping. Our approach transforms the motion planning problem into the simulation of a dynamical system in which the motion of each rigid robot is subject to the influence of virtual forces induced by geometric constraints. These constraints may enforce joint connectivity and angle limits for articulated robots, spatial relationships ...

Keywords: computational support for new manufacturing technologies, manufacturing and assembly planning, virtual environments and prototypes

11 Reconstruction and triangulation: Efficient estimation of 3D Euclidean distance fields from 2D range images
Sarah F. Frisken, Ronald N. Perry
October 2002 **Proceedings of the 2002 IEEE symposium on Volume visualization and graphics**
Full text available: pdf(12.39 MB)   Additional Information: full citation, abstract, references

Several existing algorithms for reconstructing 3D models from range data first approximate the object's 3D distance field to provide an implicit representation of the scanned object and then construct a surface model of the object using this distance field. In these existing approaches, computing and storing 3D distance values from range data contribute significantly to the computational and storage requirements. This paper presents an efficient method for estimating the 3D Euclidean distance fi ...

Keywords: 3D scanning, ADFs, distance fields, range images

12 Intelligence in scientific computing
Harold Abelson, Michael Eisenberg, Matthew Halfant, Jacob Katzenelson, Elisha Sacks, Gerald J. Sussman, Jack Wisdom, Ken Yip
May 1989 **Communications of the ACM**, Volume 32 Issue 5
Full text available: pdf(1.61 MB)   Additional Information: full citation, abstract, references, citings, index terms, review

The authors discuss the development of intelligent techniques appropriate for the automatic preparation, execution, and control of numerical experiments.

13 Real-time vision-based camera tracking for augmented reality applications
Dieter Koller, Gudrun Klinker, Eric Rose, David Breen, Ross Whitaker, Mihran Tuceryan
September 1997 **Proceedings of the ACM symposium on Virtual reality software and technology**
Full text available: pdf(1.20 MB)   Additional Information: full citation, references, citings, index terms

14 Intelligent balloon: a subdivision-based deformable model for surface reconstruction of arbitrary topology
Ye Duan, Hong Qin
May 2001   **Proceedings of the sixth ACM symposium on Solid modeling and applications**
Full text available: pdf(1.44 MB)   Additional Information: full citation, abstract, references, index terms

In this paper, we develop a novel subdivision-based model—Intelligent Balloon—which is capable of recovering arbitrary, complicated shape geometry as well as its unknown topology simultaneously. Our Intelligent Balloon is a parameterized subdivision surface whose geometry and its deformable behaviors are governed by the principle of energy minimization. Our algorithm starts from a simple seed model (of genus zero) that can be arbitrarily initiated by users within regions of intere ...

Keywords: biomedical applications, energy optimization, geometric and topological representations, reverse engineering

15 Collision detection: Minimal hierarchical collision detection
Gabriel Zachmann
November 2002 **Proceedings of the ACM symposium on Virtual reality software and technology**
Full text available: pdf(304.38 KB)   Additional Information: full citation, abstract, references, index terms

We present a novel bounding volume hierarchy that allows for extremely small data structure sizes while still performing collision detection as fast as other classical hierarchical algorithms in most cases. The hierarchical data structure is a variation of axis-aligned bounding box trees. In addition to being very memory efficient, it can be constructed efficiently and very fast.We also propose a criterion to be used during the construction of the BV hierarchies is more formally established than ...

Keywords: R-trees, hierarchical data structures, hierarchical partitioning, interference detection, physically-based modeling, virtual prototyping

16 Extremal feature extraction from 3-D vector and noisy scalar fields
Chi-Keung Tang, Gérard Medioni
October 1998 **Proceedings of the conference on Visualization '98**
Full text available: pdf(1.68 MB)   Additional Information: full citation, references, citings, index terms

Keywords: marching cubes, scalar and vector field visualization, surface and curve extremality, surface fitting

17 Collaborative gaming in augmented reality
Zsolt Szalavári, Erik Eckstein, Michael Gervautz
November 1998 **Proceedings of the ACM symposium on Virtual reality software and technology 1998**
Full text available: pdf(2.50 MB)   Additional Information: full citation, references, citings, index terms

Keywords: CSCW, augmented reality, interaction, virtual gaming

18 Interactive, agent based, modeling and simulation of virtual manufacturing assemblies
Yi Yan, S. Ramaswamy
April 1998 **Proceedings of the 36th annual Southeast regional conference**
Full text available: pdf(1.83 MB)   Additional Information: full citation, references, index terms

19 Simulation in material flow systems—trends and developments
Bernd Noche
March 1986 **Proceedings of the 19th annual symposium on Simulation**
Full text available: pdf(1.47 MB)   Additional Information: full citation, references, index terms

20 Groupware: some issues and experiences
Clarence A. Ellis, Simon J. Gibbs, Gail Rein
January 1991 **Communications of the ACM**, Volume 34 Issue 1
Full text available: pdf(7.22 MB)   Additional Information: full citation, references, citings, index terms

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21 Charles Welty
January 1984   **Proceedings of the ACM 12th annual computer science conference on SIGCSE symposium**
Full text available: 📄 pdf(1.57 MB)   Additional Information: full citation, index terms

22 Incremental algorithms for collision detection between solid models
Madhav Ponamgi, Dinesh Manocha, Ming C. Lin
December 1995   **Proceedings of the third ACM symposium on Solid modeling and applications**
Full text available: 📄 pdf(1.24 MB)   Additional Information: full citation, references, citings, index terms

23 V-COLLIDE: accelerated collision detection for VRML
Thomas C. Hudson, Ming C. Lin, Jonathan Cohen, Stefan Gottschalk, Dinesh Manocha
February 1997   **Proceedings of the second symposium on Virtual reality modeling language**
Full text available: 📄 pdf(913.46 KB)   Additional Information: full citation, references, citings, index terms

      Keywords: collision detection, virtual reality modeling language (VRML)

24 Approximating polyhedra with spheres for time-critical collision detection
Philip M. Hubbard
July 1996   **ACM Transactions on Graphics (TOG),** Volume 15 Issue 3
Full text available: 📄 pdf(5.63 MB)   Additional Information: full citation, references, citings, index terms, review

      Keywords: approximation, collision detection, interactive systems, medial-axis surfaces, spheres, time-critical computing

25 Fast collision detection using QuOSPO trees
Taosong He
April 1999   **Proceedings of the 1999 symposium on Interactive 3D graphics**
Full text available: 📄 pdf(1.31 MB)   Additional Information: full citation, references, citings, index terms

      Keywords: collision detection, hierarchical bounding volumes, orientation space quantization, primary orientations

26 I-COLLIDE: an interactive and exact collision detection system for large-scale environments
Jonathan D. Cohen, Ming C. Lin, Dinesh Manocha, Madhav Ponamgi
April 1995   **Proceedings of the 1995 symposium on Interactive 3D graphics**
Full text available: 📄 pdf(4.50 MB)   Additional Information: full citation, abstract, references, citings, index terms

      we present an exact and interactive collision detection system, I-COLLIDE, for large-scale environments. Such environments are characterized by the number of objects undergoing rigid motion and the complexity of the models. The algorithm does not assume the objects' motions can be expressed as a closed form function of time. The collision detection system is general and can be easily interfaced with a variety of applications. The algorithm uses a two-level approach based on pruning multiple ...

27 Session 3: CLODs: dual hierarchies for multiresolution collision detection
Miguel A. Otaduy, Ming C. Lin
June 2003   **Proceedings of the Eurographics/ACM SIGGRAPH symposium on Geometry processing**
Full text available: 📄 pdf(1.19 MB)   Additional Information: full citation, abstract, references, index terms

      We present "*contact levels of detail*" (CLOD), a novel concept for multiresolution collision detection. Given a polyhedral model, our algorithm automatically builds a "dual hierarchy", both a multiresolution representation of the original model and its bounding volume hierarchy for accelerating collision queries. We have proposed various error metrics, including object-space errors, velocity dependent gap, screen-space errors and their combinations. At runtime, our algorithm uses these err ...

28 A palmtop display for dextrous manipulation with haptic sensation

Haruo Noma, Tsutomu Miyasato, Fumio Kishino

April 1996   **Proceedings of the SIGCHI conference on Human factors in computing systems: common ground**

Full text available: pdf(1.97 MB), html(40.14 KB)   Additional Information: full citation, references, citings, index terms

Keywords: force display, haptic sensation, palmtop display, teleconference, user interface, virtual reality

29 A framework for simulation design of flexible manufacturing systems

Marco Chierotti, Jerzy W. Rozenblit, Witold Jacak

December 1991 **Proceedings of the 23rd conference on Winter simulation**

Full text available: pdf(798.44 KB)   Additional Information: full citation, references, index terms

30 Geometric Reasoning: Approximate medial axis as a voronoi subcomplex

Tamal K. Dey, Wulue Zhao

June 2002   **Proceedings of the seventh ACM symposium on Solid modeling and applications**

Full text available: pdf(1.19 MB)   Additional Information: full citation, abstract, references, index terms

Medial axis as a compact representation of shapes has evolved as an essential geometric structure in a number of applications involving 3D geometric shapes. Since exact computation of the medial axis is difficult in general, efforts continue to approximate them. One line of research considers the point cloud representation of the boundary surface of a solid and then attempts to compute an approximate medial axis from this point sample. It is known that the Voronoi vertices converge to the medial ...

Keywords: medial axis, point cloud, voronoi diagram

31 The VMP multiprocessor: initial experience, refinements, and performance evaluation

D. R. Cheriton, A. Gupta, P. D. Boyle, H. A. Goosen

May 1988   **ACM SIGARCH Computer Architecture News , Proceedings of the 15th Annual International Symposium on Computer architecture,** Volume 16 Issue 2

Full text available: pdf(1.73 MB)   Additional Information: full citation, abstract, references, citings, index terms

VMP is an experimental multiprocessor being developed at Stanford University, suitable for high-performance workstations and server machines. Its primary novelty lies in the use of software management of the per-processor caches and the design decisions in the cache and bus that make this approach feasible. The design and some uniprocessor trace-driven simulations indicating its performance have been reported previously. In this paper, we present our initial experience with the V ...

32 Motions & transformations: Collision prediction for polyhedra under screw motions

Byungmoon Kim, Jarek Rossignac

June 2003   **Proceedings of the eighth ACM symposium on Solid modeling and applications**

Full text available: pdf(246.45 KB)   Additional Information: full citation, abstract, references, index terms

The prediction of collisions amongst N rigid objects may be reduced to a series of computations of the time to first contact for all pairs of objects. Simple enclosing bounds and hierarchical partitions of the space-time domain are often used to avoid testing object-pairs that clearly will not collide. When the remaining pairs involve only polyhedra under straight-line translation, the exact computation of the collision time and of the contacts requires only solving for intersections between lin ...

Keywords: collision detection, polyhedra, screw motion

33 The virtual human as a multimodal interface

Daniel Thalmann

May 2000   **Proceedings of the Working Conference on Advanced Visual Interfaces**

Full text available: pdf(1.85 MB)   Additional Information: full citation, abstract, references, index terms

This paper discusses the main issues for creating Interactive Virtual Environments with Virtual Humans emphasizing the following aspects: creation of Virtual Humans, gestures, interaction with objects, multimodal communication.

Keywords: action recognition, gestures, multimodal communication, virtual humans

34 OBBTree: a hierarchical structure for rapid interference detection

S. Gottschalk, M. C. Lin, D. Manocha

August 1996 **Proceedings of the 23rd annual conference on Computer graphics and interactive techniques**

Full text available: pdf(341.04 KB)   Additional Information: full citation, references, citings, index terms

Keywords: collision detection, contacts, hierarchical data structure, physically-based modeling, shape approximation, virtual prototyping

35 A framework for human-computer interaction in directed graph drawing

Hugo A. D. do Nascimento

December 2001 **Australian symposium on Information visualisation - Volume 9**

Full text available: 📄 pdf(965.02 KB)   Additional Information: full citation, abstract, references

This paper describes some studies in Human-Computer Interaction for Directed Graph Drawing. We have developed a system where users can help some standard graph drawing algorithms to produce nice drawings of a graph according to a set of aesthetic criteria. The system follows a general framework for interaction with optimisation processes that can be applied to many optimisation problems. Some discussion about the framework and possible improvements is presented.

Keywords: human-computer interaction, optimisation, user hints

36 An interactive tool for placing curved surfaces without interpenetration
John M. Snyder
September 1995 **Proceedings of the 22nd annual conference on Computer graphics and interactive techniques**
Full text available: 📄 pdf(229.95 KB) 📄 ps(5.21 MB)   Additional Information: full citation, references, citings, index terms

Keywords: collision detection, contact point, object placement/assembly

37 Model-based object recognition in dense-range images—a review
Farshid Arman, J. K. Aggarwal
March 1993   **ACM Computing Surveys (CSUR)**, Volume 25 Issue 1
Full text available: 📄 pdf(3.42 MB)   Additional Information: full citation, abstract, references, citings, index terms, review

The goal in computer vision systems is to analyze data collected from the environment and derive an interpretation to complete a specified task. Vision system tasks may be divided into data acquisition, low-level processing, representation, model construction, and matching subtasks. This paper presents a comprehensive survey of model-based vision systems using dense-range images. A comprehensive survey of the recent publications in each subtask pertaining to dense-range image object recogni ...

Keywords: 3D object recognition, 3D representations, CAD-based vision, dense-range images, image understanding

38 Large steps in cloth simulation
David Baraff, Andrew Witkin
July 1998   **Proceedings of the 25th annual conference on Computer graphics and interactive techniques**
Full text available: 📄 pdf(465.12 KB)   Additional Information: full citation, references, citings, index terms

Keywords: cloth, constraints, implicit integration, physically-based modeling, simulation

39 GPSS/PC graphics and animation
Springer W. Cox
December 1988 **Proceedings of the 20th conference on Winter simulation**
Full text available: 📄 pdf(738.10 KB)   Additional Information: full citation, abstract, citings, index terms

GPSS/PC is a popular implementation of the discrete event simulation language GPSS, the General Purpose Simulation System. GPSS/PC has interactive graphics and animation tightly integrated into its simulation environment. Its graphics windows allow viewing and manipulation of the simulation via an optional pointing device, and assertion of all simulation primitives. All windows are online, providing for a visualization of model dynamics, and one of the windows allows animations of the simul ...

40 Sensation preserving simplification for haptic rendering
Miguel A. Otaduy, Ming C. Lin
July 2003   **ACM Transactions on Graphics (TOG)**, Volume 22 Issue 3
Full text available: 📄 pdf(2.06 MB)   Additional Information: full citation, abstract, references, index terms

We introduce a novel "sensation preserving" simplification algorithm for faster collision queries between two polyhedral objects in haptic rendering. Given a polyhedral model, we construct a multiresolution hierarchy using " filtered edge collapse", subject to constraints imposed by collision detection. The resulting hierarchy is then used to compute fast contact response for haptic display. The computation model is inspired by human tactual perception of contact information. We have successfull ...

Keywords: collision detection, haptics, level-of-detail algorithms